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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/801,571	03/17/2004	Aelan Mosden	247563US6YA	2738

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1940 DUKE STREET
ALEXANDRIA, VA 22314

EXAMINER

BARRECA, NICOLE M

ART UNIT	PAPER NUMBER
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1756

DATE MAILED: 09/26/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/801,571

Applicant(s)

MOSDEN ET AL.

Examiner

Nicole M. Barreca

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 11 July 2005.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-28 is/are pending in the application.
- 4a) Of the above claim(s) 10-20 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-9 and 21-28 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- ☒ Notice of References Cited (PTO-892)
- ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____
- ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____
- ☐ Notice of Informal Patent Application (PTO-152)
- ☐ Other: _____

DETAILED ACTION

1. Applicant's election with traverse of Group I, claims 1-9 and 21-28 in the reply filed on 7/11/05 is acknowledged. The traversal is on the ground(s) that the claims of the present invention appear to be part of an overlapping search area and that the search and examination of the entire application would not place a serious burden on the examiner. This is not found persuasive because the inventions of Groups I, II and III are distinct and have acquired a separate status in the art because of their divergent subject matter. The search required for Group I is not required for Group II or Group III. As discussed in the restriction requirement the product claims of Group II and the apparatus claims of Group III are not limited by process limitations such as forming a patterned surface using a photosensitive material and transferring the pattern to the thin film. The claims of Group III have additional recitations limiting the apparatus structure which are not required to be searched when examining the claims of Group I or II. In addition each individual search encompasses not only the subclass that the invention is classified in, but numerous other subclasses, and would therefore place a serious burden on the examiner if search and examination of the claims of all three inventions was required.

The requirement is still deemed proper and is therefore made FINAL.

2. Claims 10-20 are withdrawn from further consideration pursuant to 37 CFR 1.142(b), as being drawn to a nonelected inventions, there being no allowable generic or linking claim. Applicant timely traversed the restriction (election) requirement in the reply filed on 7/11/05.

Claim Rejections - 35 USC § 102

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

4. Claims 1, 2, 4-7 are rejected under 35 U.S.C. 102(b) as being anticipated by Sachdev (US 4,493,855).

5. A blanket layer of an organic polymer 6 (thin film) is deposited over substrate 1. A blanket layer of a plasma polymerized organosilicon film 7 (hard mask) is deposited, followed by a layer of a photo, x-ray or e-beam resist 8 (light-sensitive). The resist is exposed and developed and then used as a mask for etching of the plasma polymerized layer 7. The resist layer 8 can be removed during the etching of the polymer layer 6 in oxygen. The plasma polymerized organosilicon layer 7 is treated in an oxygen plasma, such as a conventional oxygen plasma resist asher. The oxygen plasma converts the surface and adjacent surface of the film into an etching barrier. See col.5, 15-31 and col.6, 10-col.7, 53.

6. Claim 1 is rejected under 35 U.S.C. 102(e) as being anticipated by Kawai (US 6,818,383).

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7. Polysilicon film 3 (thin film) is formed on semiconductor substrate 1.

Antireflection film 5 (hard mask) is formed and treated with plasma to modify the surface. The modified layer 4 and antireflection layer 5 are etched through the resist pattern 7c using a plasma. Film 3 is etched using the resist pattern and antireflection film as a mask. See col.3, 37-col.4, 56.

8. Claims 1, 4-9 are rejected under 35 U.S.C. 102(e) as being anticipated by Stojakovic (US 2005/0051820).

9. A stack of initial layers including a photoresist, ARC layer, hard mask and MTJ stack (thin film) are formed on an underlying layer. The hard mask is etched to form a pattern and the photoresist and ARC layers are stripped using a resist strip plasma including oxygen. As the surface of the hard mask is exposed to plasma it undergoes plasma oxidation. If needed the over etch time of the resist strip plasma may be extended to provide a thicker surface oxide. After forming the surface oxide 80 on the hard mask layer the MTJ stack 29 is etched. See also [0038]-[0042]. Table 1 discloses an etch time of 120 seconds for the resist strip and hard mask plasma oxidation.

Claim Rejections - 35 USC § 103

10. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

11. Claims 1, 3-7 are rejected under 35 U.S.C. 103(a) as being unpatentable over Angelopoulos (US 6,316,167) in view of Masuyama (US 5,114,529).

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12. A RCHX film is deposited over an oxide layer (thin film). R is selected from the group consisting of Si, Ge, B, Sn, Fe, Ti and combination thereof and X is not present or selected from the group of one or more of O, N, S and F. The RCHX layers are useful as hardmask, antireflection layers. The photoresist patterns are transferred into the RCHX film, after which the photoresist is ashed. The RCHX feature is transferred into the oxide layer. See abstract, col.14, 11-17. Angelopoulos is silent on conditions used to ash the photoresist layer. Masuyama teaches that photoresist ashing is typically performed by utilizing an oxygen plasma (col.1, 16-17). It would have been obvious to one of ordinary skill in the art that the ashing of the photoresist in the method of Angelopoulos was performed using an oxygen plasma because Masuyama teaches that photoresist ashing is typically performed by utilizing an oxygen plasma. While references do not explicitly disclose that the surface of the RCHX is treated in the oxygen plasma, one of ordinary skill in the art would have to expect the RCHX surface was exposed to the oxygen plasma and therefore modified as patterned portions the RCHX surface were exposed to an oxygen plasma during the photoresist ashing.

13. Claims 21-28 are rejected under 35 U.S.C. 103(a) as being unpatentable over Stojakovic as applied to claims 1, 4 or 5 above, and further in view of Vyuoda (US 2003/0022526).

14. The teachings of Stojakovic have been discussed above. Stojakovic teaches forming an oxidized hard mask surface during the photoresist strip and that the time of the resist strip process can be modified depending on the endpoint thickness of the oxide desired. The reference discloses an etch time of 120 seconds for the resist strip

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and hard mask plasma oxidation. The reference is silent on the temperature for the plasma oxidation and does not disclose a substrate temperature of approximately 20-400 C. Vyvoda teaches that plasma oxidation processes are typically carried out at temperatures below about 600 C [0005]. It would have been obvious to one of ordinary skill in the art to use a substrate temperature below 600 C because Vyvoda teaches that this is a typical temperature for a plasma oxidation.

Conclusion

15. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Nicole M. Barreca whose telephone number is 571-272-1379. The examiner can normally be reached on Monday-Thursday (9AM-7PM).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mark F. Huff can be reached on 571-272-1385. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Nicole M. Barreca
Primary Examiner
Art Unit 1756



9/9/05